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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XI

MAY, 1938

No. 5

Course Gains 25 Members For Worcester

Eight-Week Educational Program on Tool Steels Averages 80 to 90 Attendance

By G. H. Campbell

The Worcester Chapter recently completed an educational program on "Tool Steels." This consisted of eight weekly lectures held at the Mechanical Engineering Building, Worcester Polytechnic Institute.

The average attendance ranged between 80 and 90, and as a result of conducting the course for members only, 25 new members were added to the roster. C. M. Inman acted as chairman for the entire course.

First speaker was J. P. Gill, author of the book on "Tool Steel" which served as text for the course. Mr. Gill gave an informative and interesting talk on tool steel manufacture from the historical viewpoint. The numerous queries Mr. Gill very kindly answered after his talk proved to be as educational as the lecture proper.

For the second session Carroll Tucker, chairman of the Worcester Chapter, and superintendent of Matthews Mfg. Co., gave a lecture on testing and testing methods. A second speaker for the evening was Rodman Tattall of the Wickwire Spencer Steel Co. who spoke on functions of alloys in tool steel.

John Swift, metallurgist for the American Steel and Wire Co., presented lecture No. 3 giving a brief discussion of tool steel mill practices. He also talked of grain size and the McQuaid-Ehn and P-F penetration fracture tests, having samples of the latter for class inspection.

The fourth lecture was delivered by John Walsted of the Whitin Machine Co. and dealt with the steels of lower alloy content such as the tungsten chis-

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Tools Fail From Poor Design, Under-Hardening

By J. Arthur Reese

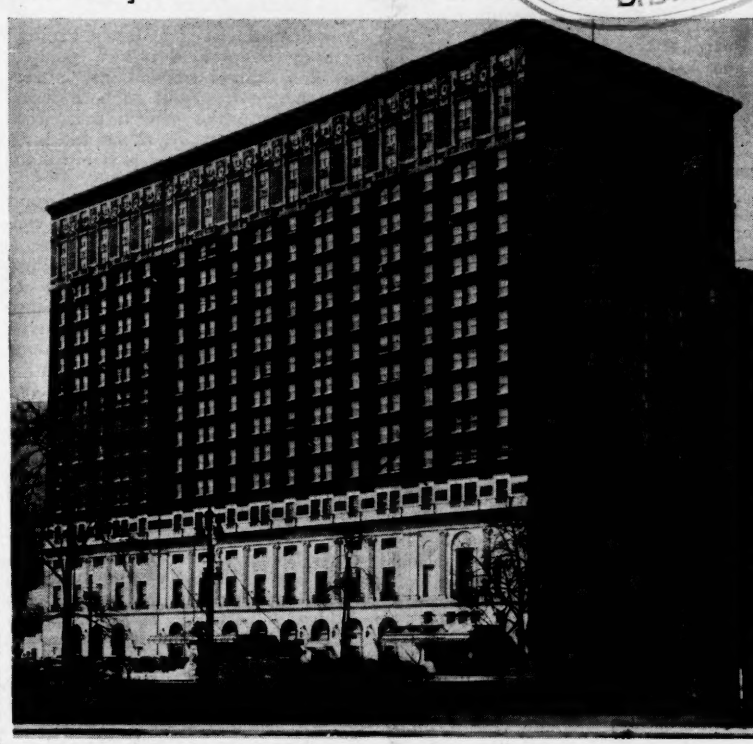
Baltimore Chapter—Howard Stagg, Balcomb Steel Division of the Crucible Steel Co. of America, addressed a joint meeting of the Chapter and the local group of the American Society of Tool Engineers at the April meeting. His subject was "Tool Steels, Their Selection and Application."

The majority of tool failures were attributed to poor design and under-hardening. Notches, sharp angles, and abrupt changes in section, which cause a concentration of stresses, aid considerably in shortening the life of a tool.

The steel manufacturer's greatest contribution to the tool maker is uniformity. In elaborating on uniformity, the speaker described the ingenious methods used by the Crucible Steel Co. for the classification of heats for hardenability.

Following Mr. Stagg's excellent address the motion picture "Steel and Tools" was shown. This picture showed the complete process of tool steel manufacture, emphasizing the chemical and metallurgical processes employed in the inspection and control of the alloys.

Headquarters for A.S.M. at Congress



The Statler Hotel, Headquarters for the American Society for Metals During the National Metal Congress Next Oct. 17 to 21, Faces Grand Circus Park, Detroit

New A.S.M. Officers Are Nominated

In accordance with the Constitution of the American Society for Metals, the Nominating Committee appointed by President Waterhouse met on Thursday, May 19, at Pennsylvania State College, State College, Pa.

Those present were Emil Gathmann, chairman, M. W. Caruthers, L. C. Conradi, E. O. Dixon, A. O. Schaefer, A. G. Zima.

Although J. W. Bolton was not present at the meeting of the Nominating Committee, his proxy submitted to the chairman prior to the meeting coincides with the nominations below. The following nominations have been made:

President (1 year)—William P. Woodside, Vice-President, Climax Molybdenum Company, Detroit.

Vice-President (1 year)—James P. Gill, Chief Metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

Secretary (2 years)—William H. Eisenman, 7016 Euclid Ave., Cleveland, Ohio.

Trustees (2 years)—Donald S. Clark, Associate Professor of Mechanical Engineering, California Institute of Technology, Pasadena, Calif. Francis B. Foley, Superintendent of Research, The Midvale Co., Philadelphia.

York Goes to Town—Largest Hall Hired To Accommodate Much-Welcomed Visitors

By Ernest G. Wigfield

The town was Steelton, the day April 20, and the Steelton members of the York Chapter wrote the word welcome in ten different languages and with a dinner crowd of 350.

As the crowd grew and grew, Carl F. Henzleman and his committee had to engage three different halls, finally landing the German Hall, which is the largest in the borough.

In the afternoon a visit through the large Steelton plant of the Bethlehem Steel Co. gave about 200 tourists the thrill of seeing a blast furnace tap, coke ovens emptying, open-hearth pouring, 80-ton ingots forged under 2,000-ton presses, and rails skipping by on the rail mills like autos coming from a ball game.

In the evening, amid gaily decorated surroundings and glorious German cooking, Burgess John Craig extended a warm greeting and introduced Frank

A. Robbins, general manager, who gave a very interesting history of the origin of the Steelton Plant.

It was started in 1866 and was the first plant to be built in the United States to make steel. Others might antedate it in steel making but they had started originally as iron plants.

Carl B. Shelley, district attorney of Dauphin County, a Steelton man, gave a stirring coffee talk on the need of a return to rugged individualism. This trait in our forefathers made us the great nation that we are and our departure from it has produced our present ills.

Dr. T. Holland Nelson, consulting metallurgist of the Harrisburg Steel Corp., then gave the metallurgical talk of the evening, telling with the help of slides of fractured ingots, the story of the crystallization of steel.

Nearly all present had spent most of their lives looking at the outside

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Show Advance Reservations Break Record

Over 90% of Exhibit Space in National Metal Exposition Is Already Reserved

The largest advance space registration in the 20-year history of the National Metal Exposition has been recorded for the show which is to be held in Detroit Oct. 17 to 21.

Of the 90,000 sq. ft. of floor space available in Convention Hall, where the Exposition will be held, 80,000 sq. ft. had been reserved before the floor plans had even been given general distribution other than to exhibitors in previous shows.

The National Metal Exposition is held annually in conjunction with the National Metal Congress and is sponsored by the American Society for Metals. Five national technical societies will cooperate in the Congress and hold technical sessions.

Featured on the technical program of the American Society for Metals will be a symposium on "Hardenability" and two lecture courses, one on "Machinability," to be presented by five different authorities, and a second on "Pyrometry" to be presented by Robert B. Sosman of United States Steel Corp. Research Laboratories, Kearny, N. J.

Headquarters for the American Society for Metals during the Congress will be at the Statler Hotel. Room rates are as follows; reservations should be sent direct to the Hotel.

Room for one per day:
\$2.50, \$3.00, \$3.50, \$4.00, \$4.50, \$5.00, \$6.00.
Room for two per day:
Double bed—\$4.50, \$5.00, \$6.00, \$6.50, \$7.00, \$8.00;
Twin beds—\$5.00, \$5.50, \$6.50, \$7.00, \$7.50, \$8.00, \$9.00.
Three persons in one room:
\$6.00, \$6.50, \$7.50, \$9.00, \$10.50.
Suite—living room, bedroom and bath:
For one, \$8.50, \$9.00, \$12.00.
For two, \$11.00, \$12.00, \$14.00

Hoyt Tells What to Do About Notched Bar Test

By H. D. Churchill

Cleveland Chapter—"The Notched Bar Test—What Are We Going to Do About It?" On April 4 the Chapter listened to S. L. Hoyt, director of metallurgical research, A. O. Smith Corp., answer this question in a very satisfactory manner.

Three important points were brought out by the speaker—first, that the notched-bar test is not an impact test but a test to determine the notch sensitivity of a material; second, that the present simple test procedure is not adequate to cover the scope of the notch behavior of steel in service; and, third, that the results of the notched-bar test must be used with care and discrimination.

The evening started with the usual Cleveland Club dinner and for entertainment, the American League sound motion picture "Batter Up" was shown.

The Chapter held its annual election, results of which will be announced in a later issue.

THE REVIEW

Published monthly except July and September by the

American Society for Metals

7016 Euclid Ave., Cleveland, O.

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Subscriptions fifty cents a year; five cents a copy. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

RAY T. BAYLESS.....Editor
M. R. HYSLOP.....Managing Editor

Cleveland, O., May, 1938
Volume XI No. 5

Eight Lecturers Give Tool Steel Course at Worcester Chapter

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el and hot work steels and the tungsten-chromium and straight chromium hot work die steels.

Everett Ayer of Braeburn Alloy Steel Co. presented a talk on the higher alloy tool steels for lecture 5, and gave a comprehensive and detailed discussion of the advantages and disadvantages of using high carbon, high chromium steels.

Lecture No. 6 was given by Vincent Stromberg of the John Bath Co. on high speed steels. He also gave a short but enlightening talk on atmosphere controlled furnaces.

For the seventh lecture Warren Van Baker of the Standard Foundry Co. with five assistants presented the practical side of heat treating in a unique manner. Dressed in working clothes and using cardboard cartons for furnaces at various temperatures, they took the audience behind the scenes in the heat treating department and with actual tools to be heat treated showed the vagueness with which a heat treater is confronted. Everyone in the class was invited to engage in discussion with the workers and much practical information was obtained from this project.

Last speaker was C. M. Inman, of Pratt & Inman, chairman of the course. He gave a complete talk on the basic principles of steel behavior on heating and cooling and then presented a résumé of the entire course.

A breakdown by occupation of those who attended gives the following:

Metallurgists and heat treaters	21
Foremen and superintendents	19
Designers	14
Salesmen	12
Machinists	10
Testers	6
Miscellaneous	7

Indiana Chapters Plan Picnic

Indianapolis and Muncie Chapters of the Society will hold a joint outing on June 11 at Idlewood Park, Pendleton, Ind., a short distance from Anderson.

The day's activities will include golf, soft ball, horseshoes and other games. The usual refreshments will be served during the day to keep everyone in a happy frame of mind.

The outing will close with a chicken dinner and distribution of prizes for the various activities of the day.

Notre Dame Hears Two Speakers on Manganese Bronze

Halliwell Discusses Theoretical Aspects; Thieme Describes Foundry Technique

By George E. Stoll

Notre Dame Chapter—"Manganese Bronze" was the subject of an interesting address by C. O. Thieme and G. P. Halliwell at the meeting held March 9.

The theoretical side of manganese bronze was discussed by Mr. Halliwell. He developed a series of alloys with a basic analysis of Muntz metal with manganese, iron, tin and aluminum added individually.

From these experiments "zinc equivalents" were derived and with the zinc equivalent of the alloying addition known, a pseudo-binary diagram was workable for the ternary system.

Curves showed the effect of variation in strength and ductility as a function of small changes of alloying content. The necessity of careful control and of using ingots or virgin metal was apparent.

The problem of tin penetration during babbling was discussed by Mr. Halliwell. His investigation led to the belief that to prevent tin penetration an alpha envelope around the grains of beta bronze is necessary. When this condition is met, diffusion of tin is practically eliminated.

Mr. Thieme described the proper founding and melting technique for the manganese bronzes. Since slight variation in zinc content manifests a wide range of physical possibilities, it is necessary to control melting carefully.

Zinc is easily oxidized even in pouring from the ladle into the mold and this loss of zinc decreases the ultimate strength and increases the elongation.

The lectures were preceded by a movie showing the operation of the plant of H. Kramer and Co., makers of manganese bronze ingots. This movie illustrated splendidly the refining and casting methods used.

Versatility Demonstrated by Telegraph, Acetylene Torch Featured at Philadelphia

By M. M. Kennedy

Philadelphia Chapter—At the dinner preceding the technical session on March 25, T. S. Brady, cable manager for Western Union, presented some very interesting facts concerning the use of the telegraph in emergencies such as the Morro Castle wreck off the New Jersey Highland, the Hindenburg crash at Lakehurst, N. J., and the recent Los Angeles flood.

With the versatility of the telegraph in their minds, the Chapter members heard J. J. Crowe, manager of the apparatus research and development department, Air Reduction Sales Co., deliver a talk which proved the oxy-acetylene torch a close "runner up" to the telegraph in this respect.

Mr. Crowe's talk was profusely illustrated with slides, showing all kinds of torches for cutting, welding, annealing, hardening, and flame machining steel.

In the discussion following the talk, the speaker stated that flame hardening is not an accurate process when compared to furnace hardening under pyrometric control, but that with a little experience sufficient accuracy is readily obtained for all practical purposes and certain jobs can be hardened which would be impossible to harden economically by any other method.

An exhibit including some very old and very modern torches proved an interesting attraction.

A SUGGESTION

For Improving the Quality and Increasing the Usefulness of A.S.M. Chapter Meetings Comes From a Loyal Member

To the Editor of THE REVIEW:

American Society for Metals, through its many chapter activities, publications and annual conventions, is rendering a great service to both metal industries and the men interested in metals. A very large, if not the largest, part of this service is being made possible by something like 380 talks or speeches every year at the chapter meetings and during the annual convention of the Society.

The arrangement of these meetings, the preparation and the delivery of these talks, occupy a very large portion of the time of chapter executives, program committees, the speakers themselves and the members of the Society who attend these meetings. Therefore, it is obvious that the question of increasing the usefulness of these meetings will deserve the serious consideration of the executive committees of the chapters and the national board of the Society.

No doubt there are many ways to achieve this purpose, such as the judicious choice of subjects and speakers, efficient manner of conducting the meetings, and securing of proper places for the meetings. One of these means to which I have given some thought (doubtlessly along with many other members of the Society) concerns the speakers themselves.

The generosity and reliability of our speakers cannot be questioned; yet at times it is quite disappointing to go to meetings and not be able to get all one should from them. This is particularly true when members travel many miles to hear a seemingly interesting subject.

While I am not an accomplished speaker myself, yet I feel that many of our otherwise excellent speakers lack only a few essential rules for delivering a technical speech.

For instance, some of the common errors are: Failing to talk reasonably loudly; lack of system in developing the main points of the subject; cramming within a short period of time a quantity of data, tables or charts, without sufficient explanation; talking too long; addressing the blackboard or the screen so that the voice is inaudible to the listeners.

I realize that the following suggestion to improve this phase of the Society's activities may appear somewhat unusual or unorthodox, but I believe that all would be greatly benefited if the Board of Trustees of the Society arranged a series of lectures on the subject during the annual convention by some recognized technical speakers, similar to other educational courses that have proven so successful at the National Metal Congress.

A good deal also could be accomplished by issuing a pamphlet on the subject or dealing with it in the publications of the Society. The results of any one of these means should prove extremely useful to both those who some day may address our chapters or conventions and to those who may listen to them.

AN OLD MEMBER

EDITOR'S NOTE: Something on this order has already been done in the form of a little booklet of "Suggestions to Chapter Speakers" prepared by the Chicago Chapter and reprinted in the August 1937 REVIEW. However, this deals mainly with mechanical details, facilities provided by the Chapter, and type of material of interest to the members, rather than with the speaker's delivery.

Metallurgists and Electroplaters Join Hands in Hartford

By R. J. Haigis

Hartford Chapter—Metallurgists and electroplaters joined hands on April 12 when the Hartford Chapter A.S.M. and the Hartford Branch American Electroplaters Society held a joint meeting to hear W. A. Wesley, chief research chemist of the International Nickel Co. Laboratory at Bayonne, N. J., talk on the subject "Electrodeposited Nickel—an Engineering Material."

Dr. Wesley considered the electrodeposition of metal as a cold casting process, thus holding the interest of metallurgists and electroplaters alike. Interesting photomicrographs were shown, illustrating the types of structure obtained from so-called soft and hard nickel plating.

A common theory accounts for the hardness of hard nickel plate by the presence of hydrogen. To indicate that this theory might not be correct, it has been shown that 90% of the hydrogen can be removed by vacuum heating, yet the hardness remains the same.

In Dr. Wesley's opinion, the hardness can be attributed to an extremely fine grain size together with a co-deposition of nickel hydroxide in fine particles critically dispersed, as in precipitation hardened alloys.

The chief commercial uses of heavy nickel plating fall into four classes: (a) Electro-typing, (b) electro-forming, (c) reclaiming old or worn parts, (d) plating new parts.

One of Dr. Wesley's most interesting exhibits was a medium size sauce-pan which had been formed from metal which had never been near a rolling mill. The pan was formed from composite copper and nickel electrodeposited sheet 0.031 in. thick.

We often run across cases where we wish we had a "putting-on tool." Dr. Wesley's talk and exhibits made it look easy to apply plenty of nickel—maybe it's the answer!

Written Questions Yield Good Stainless Discussion

By C. W. Horack

Golden Gate Chapter—At the April meeting Howard Kelty, chairman of the Nominating Committee, announced the list of officers nominated for the coming year.

The main speaker of the evening, V. W. Whitmer, of the Republic Steel Co., was introduced by Vic Minner, program chairman. The subject of Mr. Whitmer's talk was Stainless Steels.

The various types of stainless steels were discussed and illustrated by means of slides. At the completion of the talk, the speaker answered questions that had been presented in written form at the beginning of the evening. Considerable discussion arose which proved interesting and instructive.

The meeting was closed with the showing of a moving picture on the manufacture and application of stainless.

York Visits Steelton Plant

(Continued from page 1)

of steel ingots but this was the first time that many of them had seen the inside of ingots.

The various types of crystals, their lines of formation and contact showed very clearly why so many ingots fail if heavy reductions are taken to obtain speed and tonnage.

Many helpful ideas were given and the doctor said he would feel amply repaid if he had given anyone a lead toward some failure or problem in the past or future.

Induction Furnace Resembles Radio in Uncanny Results That May Be Secured

In Addition to All Advantages of a Closed Crucible, It Permits Fast Melting and Active Stirring, Meyer Tells Montreal

By Gordon Sproule

Montreal Chapter—Coming into public notice shortly after the War as the "Radio Furnace" in popular descriptions, the principle of "Induction Heating and Melting" has been developed and extended in its applications until now it may almost be compared with radio in the uncanny results that may be secured by the control of natural physical laws.

Thus introducing his subject at the March meeting, A. D. Meyer of Ajax Electrothermic Corp. gave a brief historical introduction of the Ajax-Northrup high frequency coreless induction furnace invented by E. F. Northrup at the instigation of G. H. Clamer of the Ajax Metal Co.

Induction Heating Principle

Simply stated, the principle is as follows: High-frequency current is applied to a helical water-cooled copper coil, at a voltage (800 to 1250) sufficient to overcome the inductance and force through the required power. This coil acts as the primary of a trans-

former, the secondary of which is the metallic charge in the crucible inside the coil.

With the requisite high frequency, the secondary current is induced in the outer layers only of the conducting charge, and the resulting high current density creates a powerful heating effect.

For crucibles 8 in. in diameter (150 lb. capacity) or larger a frequency of 1000 cycles per sec. is sufficient; for 50 to 100-lb. crucibles 2000 cycles are required, and for small furnaces of 3 to 30 lb. capacity the current is produced by a mercury-gap oscillator at frequencies of 20,000 to 50,000 cycles.

The thermal efficiency is, of course, very high, as the heat is created in the charge itself, and the temperature produced is limited only by the refractoriness of the crucible. The furnace has all the advantages of a closed crucible and in addition there is fast melting and an active stirring by electro-magnetic effects.

Sizes and Types

Small furnaces are ideal for melting precious metals, particularly those of high melting point, such as dental and other platinum alloys. Furnaces melting 15 to 30 lb. are useful for experimental heats, while regular commercial furnaces range in size from 100 lb. to 8 tons.

Furnaces powered at 1/2 kw. per lb. of capacity will melt down a charge in about 30 min.; large furnaces are usually powered at about one-quarter this density and require 2 to 2 1/2 hr. melting time. As the electrical equipment is rather expensive and the furnaces themselves simple and relatively cheap, it is good practice to have two furnaces in operation, or several of different sizes may be available, if not too small in relation to the generated frequency.

Stainless Scrap Remelted

Melting operations in the high frequency furnace comprise mostly the making of high grade alloys and tool steels. Stainless steel scrap may be remelted with very little loss of chromium and no carbon pick-up if the metal is clean of oil. Even vanadium alloy steel scrap has been remelted with 97% recovery of the vanadium.

High frequency induction is also being applied to heat treating and heating for forging.

Mr. Meyer showed a beautiful colored moving picture film of the heating of a round bar. A 2-in. round steel required only about 1 1/2 min. to reach 2200° F., while a 7x7-in. square may be heated in 15 min. to the same temperature.

Induction Hardening

A most interesting application is the Tocco process in which all the bearings of a crankshaft may be hardened in a few seconds.

The essential part is a "focus-inductor" in which the secondary is a heavy copper ring which is closed around each bearing. In a few seconds a thin layer of the bearing is heated to the proper quenching temperature, then a water spray is supplied through the inductor block.

The shape, depth and length of the heated layer can be accurately controlled by the form of the inductor and the time of heating; service results on the crankshafts have been excellent.

Before the lecture the members saw and heard another excellent film entitled "Flow" and presented by Crane, Ltd. of Montreal.

Sustaining Members Are Entertained by Movie of Fall Outing

By L. Geerts

Boston Chapter ushered in Sustaining Members Night on April 1, in the friendly atmosphere of the Lounge, at the Boston Chamber of Commerce.

Following an excellent dinner, introduction of the Chapter's sustaining members was made by Vice-Chairman Earl A. Downing.

R. F. Harrington then showed motion pictures taken at the fall outing. These "High Lights in the World of Sports" employing the Hal Roach technique thrust String Downing into one of the leading roles, but honors were fairly evenly divided amongst the star-studded cast. It did show the Annual Outing to be "some fun."

Attendance Survey Made

Geo. H. Burnett, chairman of the Membership Committee, reported results of the attendance survey. This effort furnished an excellent contact for new members and also will prove of great benefit to the program committee. A later résumé will be submitted to THE REVIEW for the information of other chapters.

Chairman H. H. Lester appropriately outlined the benefits of A. S. M. and its service to industry. His talk is printed in full on page 7.

Past Chairman Wm. P. Knecht presided at the technical session. Dr. George Albert Smith, Jr., assistant professor of business policy, Harvard School of Business Administration, proved able and fluent in presenting his subject, "Contemporary Social Responsibilities and Problems of Business Management."

Business Management Discussed

He contended that social concepts have moved ahead of business. The workmen, the stockholders and the public should be educated and kept fully advised on the problems of business management, to preserve harmonious relations.

Suggested was a board of directors who fairly represent the stockholders, and are selected outside of the active management to secure a broader perspective.

He further advocated making attempts to even out production with a proper research program and foresight, or thinking in longer terms.

"Business should regain its position of leadership," Mr. Smith said in concluding. "Business leaders gain nothing." (Continued on page 5)

Woodside Outlines History of Automobile at Oregon

Oregon Chapter—At the regular meeting on April 7, C. G. Chisholm, chairman of the Library Committee, made a report on the facilities available for metallurgical study in the Public Library. It was suggested that the Library Committee be made permanent.

The first part of the program consisted of a motion picture presented through the courtesy of Arthur Brown, Portland manager, John A. Roebing's Sons Co. The title of the film was "A Century of Bridge Building."

Guest of honor was W. P. Woodside, vice-president of the American Society for Metals and vice-president of Climax Molybdenum Co. Mr. Woodside's lecture was entitled "The March of Alloy Steel in the Automobile Industry Since 1900."

Mr. Woodside is admirably suited to speak on this subject since he has practically grown up with the industry in Detroit. His interesting personal experiences added greatly to the subject matter. His remarks dealing with the slow acceptance of the use of heat treatment by the different manufacturers were particularly interesting.

Carbide Tools Make Possible Pistons of Si-Al

Longwell Gives Examples of Contributions Made by Cemented Carbides to Metallurgical Development

Detroit Chapter—The important contributions Carbide cemented carbides have made to metallurgical development was the subject of a talk at the April meeting.

J. R. Longwell, chief engineer of Carbide Co., Inc., who delivered the address, presented numerous examples of improved metals developed by metallurgists that, prior to the introduction of cemented carbides, had been shelved because tools were not available for machining them economically.

One example cited was silicon-aluminum pistons. With the tool materials previously available, machining of such pistons was commercially impractical. Tools dulled rapidly and the temperature rise in the casting was so great that thin-walled castings warped and were difficult to finish.

6000 Pieces Machined per Grind

With the use of cemented carbide tools, it became possible to get from 4000 to 6000 pieces per grind and to operate at cutting speeds as high as 2100 ft. per min., with depth of cut 1/2 in. and feed of 0.026 in. per revolution. Machining causes a temperature rise of only 2° F. With the high speeds used the chip carries practically all of the heat away from the casting and the tool, and in this way warpage is eliminated.

Before the advent of cemented carbide, cylinder castings were relatively soft cast iron parts. As it was found advisable to increase the hardness of the cylinder iron, various alloying materials were added, such as copper or chromium, which hardened the material and considerably improved its casting properties.

Cemented carbides have kept pace with the development of these hard iron and alloy iron castings so that it is possible to machine this material economically.

Red Hot Casting Machined

Mr. Longwell also referred to an interesting and significant incident reported by one of the leading shipyards in this country. This shipyard had a rush repair job where it was necessary to make a 5-ton casting and machine it in the least possible time. The casting was brought from the foundry to the machine shop while still red hot and placed upon the table in the boring mill.

According to the report, in the first hour they took 261 lb. of red hot cast iron off of the casting with cemented carbide tools.

Cemented carbides have not been confined to tools, but have also found favor in the metallurgist's eyes for use in parts subjected to wear.

Pump Life Increased

"In deep-well pumping in the oil fields a new type of pump has been developed which makes it possible to pump wells economically several thousand feet deep," Mr. Longwell stated. "These pumps are let down in the casing with the cable to great depths and it is a rather expensive operation to pull them when they fail to work. Cemented carbide valve seats and balls have been made a standard part of the pumps by the metallurgists in charge. This has greatly reduced wear and increased the life of the pump."

Alloying Elements in Cast Iron Compared To Deck of Cards

By J. Arthur Reese

Baltimore Chapter—Beginning with a brief outline of the historical background, James S. Vanick, cast iron development engineer of the International Nickel Co., lectured on "Gray Cast Iron" at the February meeting.

Mr. Vanick continued by drawing an analogy between the elements present in the "cast iron" and a deck of cards. The six or seven important elements in cast iron arranged in 0.01% steps establish in kind and quality an analogy to the suits and values in a deck of cards, but provide for the consumer or foundryman the means to deal himself a good hand when playing the cards face-up.

The control of impurities for a given section or combination of section thicknesses in a casting, and the proper gating and feeding after the metal has been poured, to obtain the desired properties or structure, are some of the problems that confront the foundryman.

These factors augmented by the addition of any of the several alloying elements, either alone or in combination, can give the foundryman almost any structure conceivable if not used with discretion.

Alloy additions are not advocated as a cure-all for foundry evils; it is necessary that they be added to the proper base mixture to obtain the maximum in physical properties at the least expense.

By use of the Mauer diagram the speaker showed the narrow limitations within which the foundryman have to work to produce high strength irons.

By exercising very close control gray cast irons with a tensile strength of 50,000 psi. can be produced without alloy additions. With the addition of the proper alloying elements the tensile strength can be raised to 70,000 to 80,000 psi.

Since the scope of this topic covers such a broad field, Mr. Vanick could not dwell on any one feature or property of gray iron but, by the use of numerous slides, he ably brought out his many points in an extremely lucid and concise manner.

Snyder Stresses Design and Metallurgy Speaking on Selection and Use of Tools

By Walter M. Saunders, Jr.

Rhode Island Chapter—With particular emphasis on design, supplemented by the metallurgy of the material, Anthony J. Snyder, director of physical testing laboratory, Morse Twist Drill and Machine Co., New Bedford, Mass., discussed "The Proper Selection and Use of Tools" at the April 6th meeting.

Over 100 members and guests, attracted by the reputation of the speaker and his Company, found the talk educational for those chiefly interested in metallurgy, and enlightening to the men engaged in machining operations with drills, reamers, taps, and cutters.

Mr. Snyder traced the developments in drills from the primitive pump and later fiddle types, to the now indispensable twist drill, which was invented in 1863 by Stephen Morse of New Bedford, the founder of the present company. Of particular interest was a photograph of a small cabinet, taken a very short time later, showing the world's supply of twist drills at that date.

Drills for Various Materials Charted

Throughout his talk, Mr. Snyder used the delineascope to exhibit the actual tools and to call attention to certain features of each not readily seen in photographs.

The company has spent a great deal of time on research, which has resulted in a chart for distribution to its customers showing the type of drill suitable for any material.

Point pressures and power-torque curves in drilling operations on all common metals, bakelite, and slate, are known, and the correct lip clearance, point and helix angles can be specified

for the drill to be used with any of these materials.

Precision ground thread taps, which allow the Rockwell hardness at the crest of the threads to be known, spiral-threaded taps for such metals as aluminum, and pipe tap and drill in the same tool, were interestingly described.

Reamers of all kinds, and cutters, especially those with serrated blades of high speed or carbides, came in for their share of discussion.

Tools are made by this company from all the well-known steels, and yet Mr. Snyder stated that the 18-4-1 or 18-4-2 types of high speed steel are still far in the lead for general purposes. The cobalt and molybdenum types, however, are increasing in demand, and even bronze has been used where drilling of explosives is desired.

Unlike many of the Chapter's meetings, where the metallurgist and heat treater feel more at home than the mechanical engineer, this one gave a wealth of information to the engineer and at the same time showed the metallurgist that heat treatment is not the whole story in satisfactory performance of tools. Mr. Snyder did an excellent job combining both viewpoints.

Detroit Rex Opens Coast Office

The Detroit Rex Products Co., Detroit, manufacturers of degreasing machines, solvents, cleaners and strippers, has opened a branch office at 5905 Pacific Blvd., Huntington Park, Calif.

This office will serve the southwest section of the United States. A warehouse located at Los Angeles will carry ample stocks of solvents for immediate delivery.

Western Papers Published

FOR THE CONVENIENCE of members who would like to read certain of the papers presented at the Western Metal Congress last March, THE REVIEW presents the following list (arranged alphabetically by author) showing where the various papers have been published, or are scheduled for future publication, either in full or in abstract. As further information is received, this list will be revised and reprinted in future issues.

Armour, J. D.—Making Steels Free Machining

Substantially the same as "Improving the Free-Cutting Steels," METAL PROGRESS, Jan. 1938, p. 60.

Heat Treating and Forging, Pittsburgh, March 1938, p. 130.

Blast Furnace and Steel Plant, Pittsburgh, April 1938.

Iron Age, New York, March 31, 1938; abstract.

Broughton, W. W.—The Improvement in Zinc Alloy Die Castings—an Industrial Achievement

METAL PROGRESS, April 1938, p. 381.

de Gahl, Carl—Stainless Steel for Aircraft

For future issue of METAL PROGRESS.

Dean, R. S.—The Uses of Metals in Pyrometallurgy

Text in mimeographed form available from Bureau of Mines.

Dean, R. S. and M. von Bernewitz—Electrolytic Manganese: The First Step in a Program for the Establishment of an Electrometallurgical Industry at Federal Power Projects in the West

Mining and Metallurgy, New York, April 1938, p. 201; abstract.

Text in mimeographed form available from Bureau of Mines.

Goldstein, J. Richard—The Use of Metals in the Aircraft Industry

American Metal Market, New York; abstract.

METAL PROGRESS, April 1938, p. 357.

Canadian Metals and Metallurgical Industries, Toronto, April 1938, p. 110.

Gonser, B. W.—Tin Plate in the Canning Industry

Metal Industries, London, May 1938, p. 536.

Modern Packaging, New York, July 1938; condensed.

The Canner, Chicago, March 26, 1938, p. 13; condensed.

The Metal Working Press, Pittsburgh, April 1938.

Western Canner and Packer, San Francisco, April 1938, p. 18; abstract.

Grossmann, M. A.—Hardenability as It Affects Heat Treated Parts

METAL PROGRESS, April 1938, p. 373.

Heat Treating and Forging, Pittsburgh, April 1938, p. 182.

Krivobok, V. N.—Fabrication and Application of Stainless Steels Containing 18% Chromium and Over

For future issue of METAL PROGRESS.

LaQue, F. L.—Applications of Metals in the Chemical Industry

Canadian Chemistry and Process Industries, Toronto; serially starting in April 1938.

McQuaid, Harry W.—Metals Used in Petroleum Production

For future issue of METAL PROGRESS.

Melmoth, F. A.—Improvements in Steel Castings by Moderate Alloying and Heat Treatment

For future issue of TRANSACTIONS A.S.M.

Naujoks, Waldemar—Forgings for Aircraft

For future issue of METAL PROGRESS.

Pendrell, C. C.—New Developments and Applications of Hard Facing Material

Canadian Metals and Metallurgical Industries, May 1938.

For future issue of Oil Equipment Digest, Houston, Texas; in abstract.

Romanoff, William and C. O. Thieme—Copper Alloys in the Foundry

Canadian Metals and Metallurgical Industries, Toronto, March 1938, p. 76.

Western Machinery and Steel World, San Francisco; abstract.

Scherer, George F.—Valves for the Petroleum Industry

For future issue of METAL PROGRESS.

Scherer, Lewis F.—Metals Used in Pipe Line Construction and Operation

METAL PROGRESS, June 1938.

National Petroleum News, Cleveland, March 23, 1938; abstract.

The Petroleum Engineer, Dallas, Texas, July 1 and July 15, 1938.

Scott, Gordon N.—Theory and Practice in Pipe Protection

For future issue of TRANSACTIONS A.S.M.

For future issue (possibly July) of Oil Equipment Digest, Houston, Texas; in abstract.

Slottman, G. V.—Flame Hardening

Text available in mimeographed form from Air Reduction Sales Co., New York City.

Smith, E. K.—Chrome Steel and Iron Castings

For future issue of METAL PROGRESS (in part).

Text available in mimeographed form from Electro Metallurgical Co., New York.

Smith, E. K.—Machinability of Ferrous Castings

Hitchcock's Machine Tool Blue Book, Chicago, May 1938, p. 39.

Stoughton, Bradley—Fabrication and Uses of the Hardenable Stainless Steels Containing From 0 to 15% of Chromium

Heat Treating and Forging, Pittsburgh, May.

Iron Age, New York, March 31; abstract.

Stoughton, Bradley—Metals Used in Automobiles

Heat Treating and Forging, Pittsburgh, April 1938, p. 192.

Stuebing, A. F.—High Tensile Steels for Light Weight Construction

For future issue of METAL PROGRESS.

Thum, E. E.—Controlled Furnace Atmospheres

Substantially the same as "Preparation of Furnace Gases for Non-Oxidizing Atmospheres," METAL PROGRESS, Oct. 1937, p. 377.

Heat Treating and Forging, Pittsburgh, March 1938.

Industrial Heating, Pittsburgh, for future issue in abstract.

White, A. E., C. L. Clark and W. G. Hildorf—High Temperature Characteristics of Steels As Revealed by the Stress-Rupture Tests

METAL PROGRESS, March 1938, p. 266.

National Petroleum News, Cleveland, March 23, 1938; abstract.

Wilson, R. L.—Alloy Steel Tubing for Oil Heaters

METAL PROGRESS, April 1938, p. 372; abstract.

National Petroleum News, Cleveland, March 23, 1938.

Wilson, R. L.—The High Temperature Strength of Steels

METAL PROGRESS, May 1938, p. 499.

National Petroleum News, Cleveland, March 23, 1938; abstract.

Winston, Arthur W.—Recent Developments in the Application of Magnesium Alloy to Aircraft

For future issue of METAL PROGRESS.

Machine Design, Cleveland, May 1938; abstract.

Wright, E. C. and H. Habart—Typical Failures of Still Tubes in Refineries

For future issue of METAL PROGRESS.

National Petroleum News, Cleveland, March 23, 1938; condensed.

YOUR COOK BOOK

JUST as valuable to the metallist as the kitchen cook book is to the housewife, this "Cook" book gives the whole story of open-hearth steel making.

Written by Earnshaw Cook, "Open-Hearth Steel Making" consists of five lectures on this subject presented by Mr. Cook at the National Metal Congress last October.

You'll enjoy reading this book . . . from the interesting and exhaustive historical sketch which forms the first chapter . . . to the final chapter on the all-too-often neglected subject of process metallurgy.

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Bates Talks on Modern Trends In Metallurgy

Emphasis Shifted From Chemical Analysis to Specifying Only Desired Properties

By J. W. McBean

Ontario Chapter—For the April meeting in Hamilton the guest speaker was A. Allan Bates, manager of the chemical and metallurgical division of the Westinghouse Electric & Mfg. Co. Research Laboratories. His talk was on modern trends in metallurgy, particularly as to steel.

In the early days of modern metallurgy, great stress was laid on chemical composition, but physical properties were found to vary greatly with steels of the same apparent composition, while steels for a given use and of similar properties made by the most reputable firms varied considerably in composition.

Stress Concentration Important

Later, physical tests of tensile strength, yield point, elongation, reduction of area and Brinell hardness were plotted, and there was a tendency to lay a good deal of stress on the value of these diagrams in design, ignoring several other important factors, such as surface condition, size of piece, stress concentration, grain size, methods of loading and history of the material.

Effects of stress concentrations were illustrated by fatigue fractures in shafts with sudden changes in diameter and with drilled holes, which should have had ample strength according to the ordinary diagrams. It therefore becomes necessary to revise our former emphasis on such diagrams.

Again the physical properties depend on the history of the piece. In the ordinary iron-carbon equilibrium diagram, a definite critical point is charted for a definite carbon content. This ignores the time element, however, for the critical point will drop with an increase in the cooling rate. Using a time-temperature diagram, it was shown that to harden fully the metal should be rapidly cooled at first and then more slowly to avoid great stresses.

Quenching Rate Affects Ductility

The effect of recent work on the rate of quenching was shown in striking fashion by bending two small specimens of carbon steel. The first was quenched and tempered in the ordinary way to Rockwell C-59. It broke sharply. The second was quenched rapidly in a molten metal bath (austempered) and then held at bath temperature for a while and also showed Rockwell C-59. It would cut glass but it bent almost double without breaking.

The future tendency will be to specify the properties desired and leave the composition to the steel maker. This does not mean that chemical analysis is not a useful tool; in fact, much closer control than formerly is often required, such as in silicon transformer iron, which is held to a tolerance of 0.005% carbon.

Since the research of today often shows the practice of tomorrow, the experimental work on bombardment of atoms may point the way to future trends. For instance, chromium atoms might be made radio-active regardless of what is subsequently done to the chromium. The effect of alloying this treated chromium with iron could be observed and such pioneering work as this may lead to the designing of alloys with definite properties.

Here and There With A. S. M. Members

INSTRUMENTAL in the formation of Alloys Development Corp. as successor to U. S. Rustless Steel and Iron Corp. is BERAM D. SAKLATWALLA,



who is well known in the steel industry for his work in reducing vanadium ores and his activities with the Vanadium Corp. of America. Recipient of the Grasselli Medal of the Society of Chemical Engineers.

B. D. Saklatwalla Industry in 1924 for his work in chromium-copper corrosion resisting steels, Saklatwalla has won a prominent position in the metallurgical field.

The purpose of Alloys Development Corp., of which Frederick D. Foote has been elected president, will be to develop and promote new materials for industrial and structural uses, particularly the low-cost weight-saving steels.

TRUMAN S. FULLER, who has been with General Electric Co. since his graduation from Syracuse University in 1911, has been recently transferred from his position as metallurgist in the research laboratory to that of engineer of materials in the Schenectady Works Laboratory. Mr. Fuller has been a generous contributor to technical literature.



T. S. Fuller

J. W. WAGONER, formerly general manager of the Salem Engineering Co., has been appointed vice-president in charge of all operations, both sales and production.

Mr. Wagoner will be in complete charge of all operations at the home office in Salem, as well as branches here and abroad.

A NAME well known in non-ferrous circles is that of JOHN L. CHRISTIE, who has been associated with Bridgeport Brass Co. since his graduation from Yale in 1915. He now leaves his position as chief metallurgist to join the firm of Handy & Harman as assistant to Robert H. Leach, who has just been elected vice-president in charge of production and research. Both men are active members of various technical societies including the A.S.M.

RESIGNING his position as metallurgical engineer for Republic Steel Corp. in Chicago to do consulting work, EDWARD J. P. FISHER marks another milestone in an extremely varied career. Educated at Worcester Polytechnic Institute and Columbia University School of Mines, Mr. Fisher started out in 1921 on a series of connections which included General Electric Co., R. Wallace and Sons Mfg. Co., Carpenter Steel Co., Diamond Chain & Mfg. Co., Hubbard Steel Foundry, and finally Keystone Steel & Wire Co. in 1929. Here he stayed until 1935 when he joined Republic.



E. J. P. Fisher His vitality is also well known to various A.S.M. chapters, especially Indianapolis, where he served as treasurer and chairman, and Peoria, which he helped organize and chairmanned for two seasons.

C. L. ERICKSON, formerly manager of the Boston plant of the Walworth Co., died on March 23 after an illness of five months. Mr. Erickson was representative of the sustaining membership held by the Walworth Company in the Boston Chapter.

H. C. POOLE, former manager of Colonial Steel Co., died at his home in Newark, N. J., on Sunday, March 26. He was a member for many years of the New Jersey Chapter.

President George B. Waterhouse Entertained by Washington Chapter at Its May 9th Meeting



Candid camera "shot" made by National Secretary Bill Eisenman during his recent visit to the Washington Chapter to attend the National Officers' night on May 9th. Left to right: George A. Ellinger, secretary of chapter and assistant metallurgist, National Bureau of Standards; George B. Waterhouse, President ASM; William H. Swanger, chairman of chapter and metallurgist, National Bureau of Standards; Henry S. Rawdon, past chairman of chapter and chief of division of metallurgy of National Bureau of Standards. A report of this meeting will appear in the next issue of THE REVIEW.

Members Entertained

(Continued from page 3)

ing by being government haters; they will gain only by working out the

human problems that our industrial life has created, and by working them out more satisfactorily than the government can do."

New Steel Mill Bearings Weigh Up to 8000 Lb.

Timken Engineer Explains History and Manufacture of Tapered Roller Bearings

By A. J. Dornblatt

Washington Chapter—At the April 11 meeting A.S.M. members filled the Dodge Hotel Garden House to capacity to hear S. M. Weckstein, chief engineer of the Industrial Division of Timken Roller Bearing Co., discuss roller bearings, and to vote on the new slate of officers.

Members of the neighboring Baltimore Chapter were also in attendance and were welcomed by their Washington hosts.

After the election of officers the meeting was turned over to the guest speaker who gave a rapid-fire talk explaining the history, development, manufacture, and applications of tapered roller bearings. Mr. Weckstein's smooth, effortless and swift discourse indicated (according to one of the local members sometime after the beer had been tapped) that he made personal use of Timken tapered roller bearings.

From Wagon Wheels to Steel Mills

The history of the company was reviewed briefly beginning with the building of wagon and carriage wheels and bearings therefor.

In 1920-1921 the company began operation of its own steel mills to control the quality of its materials and now employs over 10,000 persons in its several plants, operates a 100-ton electric furnace in addition to three 125-ton open-hearth and other electric furnaces. Its products are extensively used in the automotive industry, modern high speed railroad coaches and locomotives, and heavy duty machinery in the oil industry and elsewhere.

Steel Mill and Locomotive Bearings

A notable recent development is the use of Timken tapered roller bearings 30x47x32 in. on the latest design of four-high continuous strip mills.

Bearings of this type (steel mill roll neck bearings) are of a four-row type, adjustable and interchangeable. They weigh as much as 8000 pounds each, and have rolled as much as 2,000,000 tons of steel per bearing.

Locomotives equipped with plain bearings are shopped every 70,000 to 90,000 miles for overhaul, whereas it is claimed that the railroads only overhaul the Timken-equipped bearings at 125,000 to 150,000-mile intervals. Low friction and power consumption and interchangeability are features both in the steel mill and locomotive bearings.

Ni-Mo Steel for Small Bearings

For smaller tapered roller bearings a nickel-molybdenum steel of 0.12 to 0.16% carbon is generally used, case carburized and hardened to Rockwell C-61 to 63 with a core hardness of about 25; heavier duty bearings are made of a modified Krupp composition (nickel-chromium steel) containing 0.08 to 0.12% carbon, case carburized and hardened to Rockwell C-59 to 61, with a core hardness of about 43.

Gas carburizing using natural gas is practiced except for the largest sizes, which are pack carburized using solid carbonaceous materials. The case depth varies from 0.030 to 0.20 in., depending on whether the bearing is light or heavy duty.

Mr. Weckstein supplemented his interesting talk with lantern slides and a sound movie illustrating the Timken-equipped 56-in. hot strip mill at the new Ford plant.

Free Literature — Mail Coupon Below

New Carbide Alloy

Applications of new Tungsten Carbide products which lengthen life of objects by as much as 50 times are described in a booklet issued by Metal Carbides Corporation. This new method features tougher Carbide Metal free from size limitations at a reduced price. Bulletin R-177.

Hardness Testers

A handy thing to have around for anyone who does much hardness testing is a complete and detailed catalog of the universal line of hardness testers carried by Pyro-Electric Instrument Co., together with information on various specialized pieces of auxiliary equipment. Bulletin Fb-197.

Tool Steels

Information about the fine steels made by the Uddeholm Company of America, Inc., can be obtained by requesting Bulletin Eb-196. This company controls its output completely from the ore mine to the consumer.

Melting Furnaces

An attractive and comprehensive catalog on stationary and tilting crucible melting furnaces has just been published by Fisher Furnace Co. This will be extremely helpful to anyone interested in melting furnaces. Bulletin Eb-195.

Enameling Racks

The "A, B, C's" of selecting enameling racks are set forth in interesting manner in a clever little 8-page booklet published by the Driver-Harris Co. Bulletin Eb-19.

Drop Forging Topics

The latest issue of the 8-page "Drop Forging Topics" published by the Drop Forging Association gives interesting information and side-lights on the many uses for drop forging. Written in newsy style and well illustrated, this miniature newspaper is worth reading. Bulletin Eb-123.

Electroplating

A complete group of chemicals, processes and materials of interest to those engaged in electroplating is listed in this 8-page booklet published by the E. I. du Pont de Nemours & Co., Inc. Bulletin Eb-29.

Monel and Nickel

An exhaustive study of Monel Metal and Nickel is contained in a 20-page booklet issued by the International Nickel Co. Well illustrated by pictures of these metals in actual use. Bulletin Eb-45.

Rotary Drill Pipe

"The Development of Rotary Drill Pipe," an address by H. W. Graham, general metallurgist for the Jones & Laughlin Steel Corp., has been reprinted by that company and is available in the form of a 22-page booklet. Contains many worthwhile drawings and half-tone illustrations which show analysis, structure and properties of different pipes. Bulletin Eb-50.

Tempering

Tempering under fully-automatic control as practiced by Jacobs Manufacturing Company is described in a folder issued by Leeds & Northrup Company. The Homo furnace used by this company is fully covered by the text and individual qualities pointed out. Bulletin Eb-46.

Continuous Rail

Elimination of joints in railroad tracks by the use of welding cuts down track maintenance according to a 36-page booklet just issued by the Metal & Thermit Corporation. Continuously welded rail a mile or more in length is described and installations of welded track in many parts of the country are pictured. Attractively presented, this booklet gives a valuable insight on metal progress in the transportation industry. Bulletin Eb-64.

Balancing Machine

A new booklet from the Tinius Olsen Testing Machine Company describes their Vibro-Electric-Static-Dynamic Balancing Machines. This type of balancing machine is ideal equipment for balancing, both statically and dynamically in one operation, any small high speed rotating part, where an accurate balance is a prerequisite. Bulletin Eb-147.

Dust Hog

"Why Should You Provide for this fellow and pay for a Dust Hog's Bill of Fare?" is the pertinent question asked in a clever folder just released by the Pangborn Corporation. Points out the large losses due to dust in industry and suggests a cure. Bulletin Eb-68.

Steel Buyer's Guide

A handy pocket-size book which gives complete listings and descriptions of the wide range of Certified Steels and allied products carried in stock by Joseph T. Ryerson & Son, Inc. Included in this Stock List are handy reference tables, weight charts, standard specification listings, etc. Bulletin Eb-106.

The Review

7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon. (Please print.)

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Eb-196 Eb-46	Aa-8 Ca-110	Oy-25 Oy-43	Cb-66 Ka-13
Eb-195 Eb-64	Na-37 Oy-15	My-75 Eb-167	Bb-124 La-93
Eb-19 Eb-147	Dy-6 De-4	Oy-71 Bb-11	Bb-163 Jy-125
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Eb-29 Eb-106	Ia-30 Oy-54	Db-171 Fx-57	Ka-49 Ny-48
		Db-100 Jy-12	Bb-51 La-180
		Db-18 Db-194	Dy-133 Db-182
		Db-90 Ca-22	

Cutting Oils

D. A. Stuart Oil Co. offers a new 48-page copyrighted booklet entitled "The Story of Sulphurized Cutting Oils." This new booklet features the scientific application of cutting fluids on metals of different analyses and is well illustrated throughout, an original type of cutting oil application chart proving of particular interest. Bulletin Eb-118.

Photometer

Carl Zeiss, Inc., is offering a new booklet which describes the Zeiss Pulfrich Photometer. Absolute colorimetry without comparison solution, in metal analysis is very accurate by this instrument. Bulletin Eb-28 will be sent on request.

Cr Stainless Steels

Complete information attractively presented on Enduro AA, S, S-1, and FC is contained in a booklet by Republic Steel Corp. Enduro AA is the 18% Cr steel, and S, S-1 and FC are of the 11 to 16% Cr type. Bulletin Aa-8.

Bi-Optical Pyro

A new bi-optical pyrometer presents the solution of optical temperature measurements without the uncertain correction coefficients by simultaneously measuring "black body" and "actual" or "color" temperature. Fully described by the Pyrometer Instrument Co. Bulletin Na-37.

X-Ray Examination

The application of X-ray examination and inspection of castings, welding, and food products, as well as practical X-ray crystal analysis, is completely described and strikingly illustrated in General Electric X-Ray Corp.'s new 34-page publication. Bulletin Dy-6.

High Pressure Meter

Special flow meters for high pressure measurements are described in a bulletin by the Foxboro Co. A sectional view of one of these meters indicates six features which go to make this a rugged instrument for high pressure use. Bulletin Ab-21.

Pickling

All current pickling procedures and practices were carefully studied, analyzed, summed up and compared in the preparation of a 32-page handbook on pickling steel with modern inhibitors by E. F. Houghton & Co. A frank, instructive manual. Bulletin Ia-38.

Silver Solder

The results of both laboratory and actual production data are contained in a booklet by Handy & Harman which includes detailed instructions and two pages of hints on the subject of soldering and brazing with silver alloys. Bulletin Ay-126.

Split Second Control

Westinghouse Electric & Mfg. Co. offers ten ways to increase profits with Ignitron split-second welding controls in an informative and attractively made booklet. Results are demonstrated and various models of the control described. Bulletin Ab-134.

Airless Cleaning

Comprehensive coverage of abrasive cleaning and preparation methods by description and illustration is contained in a colorful book published by the American Foundry Equipment Co. It describes the airless abrasive cleaning and preparation method known as "Wheelabrating." Bulletin Dx-112.

Radio Principle

How a tried and accepted principle of radio engineering is successfully applied to industrial control instrumentation is described in a folder on a new low-price automatic controller by Wheelco Instrument Co. Bulletin Ca-110.

Superior Heat Treating

C. I. Hayes, Inc. tells about the experience of a firm heat treating a wide variety of carbon, alloy, stainless and tool steels, and tells how the installation of "Certain Curtain" furnaces speeded up the heat treating and gave more uniform results. Bulletin Oy-15.

Molybdenum

Climax Molybdenum Co. presents their annual book giving new developments in molybdenum, particularly as an alloy with iron and steel. The engineering data presented are made clear by many tables and illustrations. Bulletin Dc-4.

Conveyor Furnaces

Continuous chain belt conveyor furnaces handle miscellaneous parts without pans or trays—they are efficient, uniform and flexible in operation. Improved furnaces of this type are described by Electric Furnace Co. Bulletin Ay-30.

Aluminum Finishes

Good printing, good paper, spiral binding and an attractive presentation add interest to the valuable technical information on "Finishes for Aluminum" contained in Aluminum Co. of America's new booklet. Bulletin Oy-54.

Ultrapak

Two booklets are issued by E. Leitz, Inc., one containing description and catalog of their Ultrapak microscope equipment and the other a series of quotations and illustrations from scientists using the method. Get both by asking for Bulletin Ax-47.

Chromel

A new catalog has been issued by Hoskins Mfg. Co. covering Hoskins electric furnaces and Chromel elements, which provide uniform heat and automatic temperature control with excellent production and quality of work. Bulletin Ia-24.

Global Elements

Global electrical heating units and a variety of accessories for their operation are shown in a catalog by Global Division of Carborundum Co. Bulletin Oy-25.

Insulating Firebrick

Complete information on the five types of insulating firebrick made by Babcock & Wilcox Co. is contained in a new booklet. The physical description of typical applications and illustrative descriptions of lightweight constructions should interest all those concerned with furnace construction and maintenance. Bulletin My-75.

Rolling Mill Bearings

Timken Roller Bearing Co.'s 64-page, 8 1/2 by 11 in. booklet entitled "The Answer to Rolling Mill Bearing Problems" will appeal strongly to mill designers and operators. It is well printed and liberally illustrated with photographs and diagrams. Bulletin Oy-71.

Meehanite

A compact but complete specification chart gives the recommended grades of Meehanite metal for various service requirements. Complete physical properties and applications are included. Bulletin Da-165.

Welding Electrodes

Smootharc Electrodes for every type of work are described in this booklet by the Harnischfeger Corporation. Points out advantages and particular applications of different electrodes. Bulletin Db-171.

Heat

This 48-page book published by Johns-Manville describes the dramatic story of man's age-old struggle to control Nature's most powerful force. "Heat" makes easy and interesting reading. Bulletin Db-100.

Lectromelt Furnaces

The story behind lectromelt furnaces is well told in this 48-page booklet issued by the Pittsburgh Lectromelt Furnace Corporation. Tells of development of this type furnace and describes recent improvements. Bulletin Db-18.

Correct Alloys

A four-page folder pointing out the importance of correctly designed metallurgical alloys which fits the needs of product and process has been published by the Titanium Alloy Manufacturing Co. Also points out the importance of the spectrograph. Bulletin Db-90.

Vertical Carburizer

The Hevi Duty electric vertical retort carburizer is particularly applicable to intricate parts and selective carburization, where distortion must be held to a minimum. It is described in Bulletin My-44.

Binocular Mike

Extremely wide field, long working distance, and stereoscopic vision are only a few of the advantages cited by Bausch & Lomb for the improved KW American Hot Dip binocular microscope. Price list and description of accessories included. Bulletin La-35.

Salt Bath

"Heating from the inside out" is what makes the Ajax-Hultgren salt bath furnace practical. Ajax Electric Co. explains this new operating principle in an interesting folder. Bulletin Oy-43.

Galvanizing

An informative, historical, simple digest of galvanizing forms a guide to longer life for iron and steel products. This handsome, handy, 24-page book beautifully printed in color is distributed by American Hot Dip Galvanizers Association, Inc. Bulletin Ea-167.

Furnace Headquarters

American Gas Furnace Co., headquarters for 59 years of heat treating furnaces and machines, for efficiency, economy, and production, has issued a general catalog describing various types of equipment and their operation. Bulletin Bb-11.

Tempering

Vertical batch type tempering furnaces are described in a folder by Industrial Heating Equipment Co. Capacity and production figures and a diagram of the furnace are included along with a complete description. Bulletin Ia-168.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbox tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Stainless Slide Chart

Carpenter Steel Co.'s pocket-size slide chart gives at a glance the technical data on all stainless steels. Bulletin Jy-12.

Hardener's Pal

J. Milton Luers, Detroit, Mich., has just perfected the "Ste-Tre-Meter", an accurate timer for steel treatment. It's an invaluable aid to the steel treater and will save thousands of dollars in eliminating burnt or soft steel. Write for attractive folder giving full details. Bulletin Db-194.

Rockwell Tester

A revised and completely up-to-date catalog on the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Turbo-Compressors

Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Tubulaire

A new method of electric heating which combines circulation, greater radiating surface, and great strength is embodied in tubular resistor elements. Description, specifications and illustrations for the type made by Lindberg Engineering Co. are contained in Bulletin Cb-66.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Duronze

An 80-page technical handbook covering the physical properties and applications of four high strength silicon bronzes pioneered by Bridgeport and sold under the trade name "Duronze alloys" has been released by the Bridgeport Brass Co. Bulletin Bb-163.

Pipe and Tubes

Handbook and price list containing practical and technical information on Misco "Centric" pipe and tubing (stainless, corrosion and heat resisting) is available from Michigan Steel Casting Co. Bulletin Bb-84.

Heat Treat Chart

Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shop. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Carbottom Furnaces

Operating data, illustrations, interesting text, are featured in the folder by Surface Combustion Corp. on carbottom furnaces for general heat treating purposes. Bulletin Bb-51.

Laboratory Service

A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Scleroscopes

Shore Instrument & Mfg. Co. describes its Model D standard recording scleroscope in a recent bulletin which explains the theory and practice of hardness testing with this machine. Bulletin S-33.

Newer Tool Steels

Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Pictorial Story

A pictorial and descriptive story of the manufacture of steel products by The Youngstown Sheet and Tube Co. is in reality a textbook of basic steel information contained in a 115-page leather-covered, pocket size ring binder. Bulletin La-93.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Dolomite Refractories

The case of Clinkered vs. Calcined Dolomite in the basic openhearth steel is set forth interestingly in a new pamphlet by Basic Dolomite, Inc., Cleveland, O. Bulletin Db-192.

Electric Salt Baths

Literature is available from Bellis Heat Treating Co. describing electrically heated bath furnaces which are economical to operate and have a wide range of applications in hardening, annealing, and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

Electronic Control

Exactly how the electronic principle is used to insure exact automatic control of furnace temperature is told and full data given on the "Alnor" pyrometer controller made by Illinois Testing Laboratories, Inc. Bulletin La-180.

For the Laboratory

Fisher Scientific Co.'s new catalog on Cast-alloy laboratory appliances is well arranged and informative. It covers the complete line of clamps and frames for all laboratory purposes made of this high strength corrosion resisting material. Bulletin Db-182.



The Junior Members' Page



The A.S.M. in Industry ~

By H. H. Lester
Chairman, Boston Chapter

An address before the Boston Chapter on Sustaining Members' Night, April 1, 1938.

In February, the membership of A.S.M. totalled 10,771 in 48 local chapters scattered from Houston to Montreal, and from Los Angeles to Boston.

Through THE REVIEW, a report of this meeting and of all other chapter meetings may reach each individual of every chapter.

What does this large and far-flung membership consist of?

The American Society for Metals is a technical society, but it differs from others in some important respects. That is, A.S.M. is an industrial society. There are technical societies of the highest caliber, such as the A.S.M.E., the A.I.M.E., and others where there are educational and professional requirements for membership. We sometimes refer to these as "high brow" organizations, but the term is unfair if one applies it in a derogatory sense.

Those so-called "high brow" groups are doing magnificent work in advancing technological information along the frontiers of knowledge. However, they are professional rather than industrial.

In the A.S.M. there are no educational or professional requirements. Anyone who is interested in metals, is a reasonably decent fellow, and is willing to pay his dues may qualify.

As a result of this liberal admission policy, the A.S.M. has a broad spread in its membership and offers a common meeting ground where college professors, research workers, engineers, salesmen, company executives, the pale white collar men, and the rough-necked handlers of hot steel may come together on a basis of equality held by a common interest—service to the industry that typifies, in most cases, not only their livelihoods but their lives.

The distinction may be drawn that in the professional society the interest is in the advancement of the profession, in the industrial society the interest is in the advancement of the industry; the latter necessarily is much broader in its aims, but both are necessary in an industrialized society.

There are subversive influences in this and all other countries today that are apparently seeking to tear industry apart. I refer to the struggle between labor and capital. This struggle seems ridiculous to me. The interests of both groups are really the same. Neither can prosper if industry is destroyed; both benefit when industry is helped.

The broad democracy of the technical industrial society, particularly as exemplified in A.S.M., is one of the best antidotes for these disruptive forces.

Interest is focused on the technical aspects and the technical progress of the metal industry that come within the scope of the society activities. There may be vigorous conflicts of opinion, but there are no conflicts of personal interest, hence no cause for rancors.

The A.S.M. thus serves to bring together, in a friendly atmosphere, men who might be antagonistic in a different one, and keeps dominant the idea of the unity of their common interest. It is distinctly constructive in its influence. In my opinion, this is one of the greatest services of the Society.

This service is truly important. In this topsy-turvy age, when emotionalism and base motives seem to govern the actions of nations and men, the conservative forces in our civilization become doubly valuable. We think A.S.M. serves those forces that make for sanity and greater social stability.

It is hardly necessary for me to remind this group as to how we serve.

Most of you attend month after month, and hear lectures from outstanding men in the industry who bring to you messages of latest advances in the art. Many times details come out in discussions that you would not get in a written paper. You have the advantage of presenting your shop problems to experts, and much of the information you gain is carried to your job and translated into improved production.

Many of you here tonight have attended the enthusiastic educational lectures and have taken real advantage of the opportunity to learn how practical men have been and are using theoretical metallurgy in everyday practical work.

You know that these efforts are not mere local activities. You know that the national office strives to make the society a coherent, closely knit group and effects the exchange of information through traveling visits of the national officers, through personal correspondence, and through the medium of THE REVIEW. You are all familiar with METAL PROGRESS, the finest publication of its kind in the world, and are familiar with the great industrial show put on annually at the metal congress.

These things, gentlemen, are what I call to your attention as services to industry. In my humble opinion, A.S.M. has come to be a most potent force in the economic life of the nation. Its influence is conservative and stabilizing. It is a sedative to our social ills.

To our sustaining members in whose honor this meeting tonight is dedicated (please note that I do not call you our guests) I have this final remark. I do not like the term *sustaining*. It seems to indicate that we are interested only in your \$25.00. This is not true.

We feel, and want you to feel, that you are vitally a part of the Society. Many of you are very actively contributing. Some of our most prominent workers by right are sitting tonight in the seats reserved for the sustaining members.

We want you to feel that the work we are doing is worthwhile, and that you regard it a privilege to contribute toward its success. We regard your contributions as evidences of appreciation which we are confident we will continue to call forth.

Mines Group Holds Two Meetings in Five Days

By Max Bolotsky

Missouri School of Mines Group — After a quiescent period of several weeks, the Chapter resumed its activity by holding two gatherings within the space of five days.

On April 14 A. E. Crockett of Jones and Laughlin Steel Co. appeared before the group to show motion pictures on the manufacture of integral joint steel pipes and to deliver a talk on "Research and Science in the Steel Industry."

R. S. Dean, chief engineer of the metallurgical division of the U. S. Bureau of Mines, and an alumnus of M. S. M., was the guest speaker at the second meeting on April 19.

Dr. Dean narrated the "Activities of the Bureau of Mines in the Field of Electro-Metallurgy," dwelling especially on the research conducted by the Bureau in the electro-metallurgy of manganese; research whose success, Dr. Dean stated, has opened up a new field of metallurgy—the use of manganese as the base-metal of alloys.

QUIZ QUESTIONS

THE \$5.00 prize for the most original and appropriate set of ten metallurgical brain teasers submitted to the new Quiz Questions Department of THE REVIEW has been awarded to Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp., Chicago. George L. Kehl, Lehigh University, and Martin Seyt, Cleveland Chapter, have been given honorable mention. See how many of Dr. Grossmann's questions you can answer without peeking at page 8.

- The first copper rolled in the United States was rolled by
John Hancock
Benjamin Franklin
Paul Revere
Alexander Hamilton
Ulysses S. Grant
- True or false:
(a) The elements commonly found in all steels, namely carbon, manganese, phosphorus, sulphur and silicon, are all lighter in weight than iron.
(b) The alloying elements nickel, chromium, molybdenum and tungsten are all heavier than iron.
- Pig iron is so called because when cast it had a fancied resemblance to a litter of pigs.
because iron oxide is a pigment.
because an unsightly mass of metal scrap was in the early days called a pig-pen.
because the god of iron was Pygmalion.
- The mineral which is the commercial source of aluminum is
cryolite
ilmenite
bauxite
scheelite
termite
- True or false:
(a) The iron Pillar of Delhi, standing since 400 A.D., is now known to have been so corrosion resistant because it contained considerable chromium.
(b) There are three metals having a yellow color.
- Designate the following statements as true or false:
(a) Copperas contains no copper.
(b) Tin cans contain no tin.
(c) German silver contains no silver.
(d) Lead pencils contain no lead.
- Lowest carbon content is found in
cast iron
wrought iron
pig iron
alpha iron
ingot iron
- The largest single item, by weight, charged into a blast furnace is
coke
iron ore
air
coal
limestone
- The first large single order for stainless steel in the U. S. went for which one of the following items:
Sheets for the Chrysler Building.
Radiators and trim for Ford cars.
Nitric acid towers for Du Ponts.
Trim for the Empire State Building.
- The principle of the open hearth furnace was originated by
Huntsman
Siemens
Bessemer
Carnegie
Faraday
Heroult

X-Ray Used in Foundry for Checking Work

Serves to Develop Proper Technique; Other Practical Uses of X-Rays Told

By George E. Stoll

Notre Dame Chapter—The generation of X-rays and a general discussion of some of the variables served as an introduction to a lecture on "The Industrial Applications of X-Rays" presented at the April meeting by Kent R. Van Horn of Aluminum Co. of America.

Radiography, that phase of industrial application that depends on the different absorptive characteristics of different materials, has many uses, such as an inspection tool for hidden parts of assembled pieces. Its use in developing a proper foundry technique was stressed.

As a complete inspection unit the X-ray is generally too expensive and so in the foundry it should be used only as a means of checking a procedure. Any new casting in a foundry is made first according to the foundryman's conception of the best method. If, on radiographing, a shrink is revealed, it may be necessary to change the method radically or to place a riser or chill in the proper location.

The casting made by the new method is checked and if all right then only an occasional one need be checked to keep in touch with possible changes of another variable.

X-Ray Diffraction Shows Austenite

Another property of X-rays, that of being reflected by the atom planes of a crystal, has led to many developments in theoretical metallurgy, as well as practical applications.

As a practical example Dr. Van Horn cited the use of diffraction methods to show the presence of the face-centered lattice of austenite in tempered spring wire. This retained untransformed austenite is particularly dangerous because the transformation to martensite on deformation is likely to cause cracking.

The presence of strains and drastic cold working of metals is revealed readily in the type of pattern obtained. The preferred orientation revealed in a monochromatic pinhole pattern indicates the aligning of the crystal fragments in definite directions.

The unworked specimen with the atom planes of the individual grains at a random orientation gives concentric circles made of many fine dots, each one of which was reflected from an atom plane in a position to satisfy the requirements of Bragg's equation.

Pattern Reveals Grain Size

The grain size is also revealed in this same pattern. If the dots are large and far apart, then the grain size is large. If the grain size is infinitely small, the circles will be continuous.

Finally, X-rays may be used for analyzing various compounds. For example, chemical analysis does not reveal whether the carbon is amorphous or crystalline. If control of the amount of each is needed, as in the making of electrodes, then the X-ray is a convenient tool to use. The amorphous carbon will have no pattern, whereas the crystalline carbon will have the characteristic pattern of the hexagonal system.

Anti-Corrosion and Bearing Qualities Favor Choice of Non-Ferrous Alloys

By J. W. McBean

Ontario Chapter—Planned to coincide with the Canadian Mining and Engineering Exhibition, a joint meeting with the Canadian Section of American Foundrymen's Association was held on March 17.

Guest speaker was A. E. Cartwright, metallurgist of the Robert Mitchell Co. Ltd., Montreal, and his talk concerned "The Selection and Production of Some Cast Non-Ferrous Alloys."

The qualities that favor the choice of these in preference to ferrous-base alloys are principally anti-corrosion and bearing qualities.

Mr. Cartwright reviewed the effects of various quantities of tin, lead, zinc and phosphorus in the commoner tin bronzes. In amounts up to 2%, zinc is often superior to other deoxidizers in promoting good foundry behavior and sound castings. Lead and phosphorus are valuable for wearing and bearing services.

The speaker drew attention to the advantages and limitations of manganese, aluminum, and silicon bronzes. Aluminum bronzes are superior to most other copper-base alloys in acid re-

sistance, fatigue properties, and strength at elevated temperatures.

The principal alloys containing significant amounts of nickel were reviewed with emphasis on their corrosion resistance and strength at normal and elevated temperatures. The recent extension of certain properties of monel metal by inclusion of silicon in amounts up to 4½% is exemplified in monel grades "H" and "S."

Care in the selection of alloys for corrosion service was emphasized. The foundry may render the customer a considerable service by maintaining a stock of its alloys in convenient size and shape for submission to plant tests under actual operating conditions.

For acquiring data for preliminary selection of alloys, a laboratory corrosion tester was illustrated, and results shown for a series of alloys tested in 10% acetic acid and 5% sulphuric acid. These illustrated the means of evaluating the various compositions and the possibilities for development of improved alloys for corrosion service.

A number of slides were shown of gating and feeding castings which illustrated means of securing the hottest metal in the feeding heads at the end of pouring. A novel method sometimes used with dry sand molds is to pour castings entirely through the feeding heads which contain strainer cores seated in the top of the heads.

Greater density is obtained, through enhanced feeding efficiency, from this practice, and the required pouring temperatures are generally lower—an advantage from the metallurgical standpoint of lower superheating requirements.

Photographic records of the gating practice along with other details of production are kept for reference and certainty of duplication for future repetition.

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SALESMAN-ENGINEER, recent graduate metallurgist, Purdue University. Tau Beta Pi. High degree versatility. Public speaking ability. Available for three months, June 15-September 15. Experience in non-technical sales. Limited development work in gas carburizing and aluminum castings.

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SHEAR KNIFE SALES ENGINEER: Good opportunity for right man with sales ability and knowledge of steel mill requirements. Box 5-30.

HEAT TREAT FOREMAN: Large and modern hardening room, 100% electric, latest equipment, working on small tools, gages and special machinery. Must be good shop executive capable of handling crew of 3 to 10 men; alert for new ideas and methods; and not afraid to roll up his sleeves and handle a heat. Box 5-40.

Positions Wanted

ASSISTANT METALLURGIST: Four years experience in tool and stainless steels. Experience in physical testing, metallography, and heat treatment. Age 31; married. Laboratory work preferred but not essential. Will locate anywhere in the East. Box 5-5.

SALES AND SERVICE EXECUTIVE: Metallurgical engineer, steel mill trained. Five years experience in sales and servicing of steel and allied products; nine years aggressive managing technical sales and service and directing introduction, marketing, and practical research of chromium-nickel alloys and heavy chemicals to steel mills, foundries, drop forging, automobile and general steel consuming industries. Box 3-20.

METALLURGIST: 26, B.S. in chemical engineering. Experience in metallography, plating and heat treating. Box 5-15.

COLLEGE MAN: Age 22; Sophomore at Brooklyn Polytechnic Institute, four years experience in New York's foremost Heat Treating concern. Desires connection in Heat Treating Plant. Will go anywhere and accept a very moderate salary. Box 5-70.

METALLURGIST: B.S. Missouri School of Mines, 1933; age 27. 2½ years experience in laboratory, casting and fabrication of brass, bronze, and nickel silver; 1 year experience in forging, pressing, forming, and heat treating of steel; ½ year experience in high speed tools; work with controlled atmosphere and gas analysis. Available immediately; any location. Box 3-50.

CHEMICAL ENGINEERING GRADUATE 1937: Experience in analytical work on cast iron, steel and sand; optical pyrometry; physical testing. Would like position in foundry or steel mill with opportunity to study production work and its problems. Box 5-25.

SALES ENGINEER: Competent contact man, 36 years old, 14 years experience in production and sales service work. Authority on pickling and coating practice. Well acquainted

in steel and allied industries. Can be an extremely useful man in a progressive organization. B.S. and Met. E. degrees. Box 5-35.

FOREMAN HEAT TREATING DEPARTMENT: 25 years practical experience in heat treating forging, trimming, blanking and forming dies, high speed cutters, gears, tool steels, carburizing and general tool production work. Experienced metallographer. Excellent references. Eastern district preferred but not essential. Box 5-10.

SUPERINTENDENT: Able to take full charge of all drop forging, heat treating, machining and tool and die work; 18 years experience. Also master mechanic. Box 5-20.

METALLURGIST: B. Met. E., M.Sc. Six years experience as metallurgical assistant and routine chemist in steel tube plant; four years non-technical business experience. Desires connection with plant that processes steel tubing for automotive use. Cleveland district preferred but not essential. Age 35. Available June 15. Box 3-55.

METALLURGIST: 35, with ability to inspire study and organize and direct research, desires to enter educational field. Doctorate in metallurgy from recognized school; eight years varied industrial experience. Publications; excellent references. Box 3-60.

HARDENER: Thoroughly experienced in the heat treatment of carbon and alloy steels. Can operate oil, gas, electric, and vapor-carb furnaces, hardness testing equipment. 20 years experience, 16 years with one firm. Box 5-45.

METALLURGICAL ENGINEER: B.S. University of Illinois, 1937. Two years experience in coal analysis and general chemical testing laboratory work; 9 months in acid open-hearth steel melting. Desires permanent connection at small salary in metallurgical department of aggressive steel or automotive concern. Age 25, single. Chicago area preferred but not essential. Available immediately. Box 5-50.

FOUNDRYMAN: Ferrous or non-ferrous. Your years apprenticeship and three years as qualified molder. Has assisted in metallurgical laboratory in inspection, testing, processing of photographic and radiographic films. Two years technical college. Location not important. Box 5-55.

SALES ENGINEER: Graduate Case School of Applied Science in metallurgy; 29, married. Will consider production training or laboratory work for experience. Five years varied office background, market analysis, sales, accounting, advertising. Location immaterial. Available immediately. Box 5-60.

Oregon Appoints Library Committee; Hears Zima

By N. L. Peck

Oregon Chapter—Dinner meetings seem to be very popular with the members as evidenced by the 55 present on Feb. 11.

At the business meeting a motion was passed that Chairman Graf represent the Chapter on the national nominating committee.

Chairman Graf then appointed a Library Committee consisting of C. G. Chisholm, chairman; L. P. Byrne, and D. C. Gore.

The duties of this Committee are to determine facilities available in the library and work in advisory capacity with librarian in purchasing new books and magazines. A report was requested for next meeting on the library metallurgical material now available.

Albert G. Zima of the International Nickel Co. delivered a paper entitled "The Role of Nickel in the Development of Modern Cast Iron." This paper

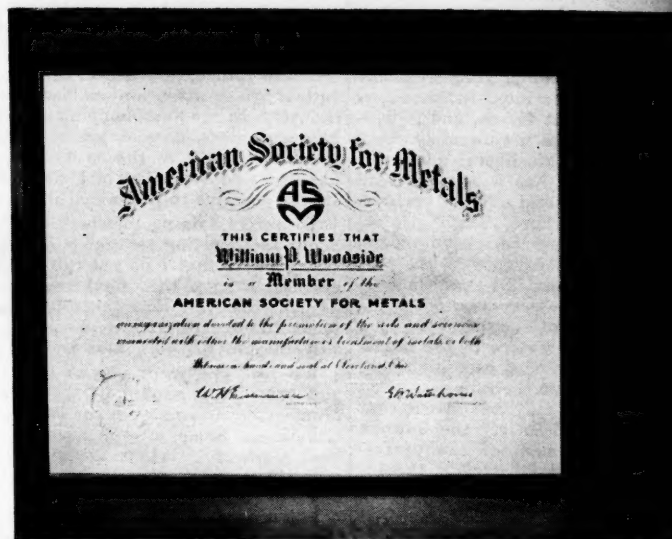
has already been reviewed in a previous issue.

The last part of the program was devoted to several motion picture films furnished through the courtesy of the Chevrolet Motor Co. These pictures dealt with such subjects as inspection, manufacturing, and traffic problem studies.

Answers to Quiz Questions

1. Paul Revere.
2. (a) True; (b) False (chromium is lighter than iron).
3. Because of the fancied resemblance to a litter of pigs.
4. Bauxite.
5. (a) False; (b) True (copper, gadolinium).
6. (a) True; (b) False; (c) True (d) True.
7. Alpha iron. (When it contains any carbon, it is no longer called alpha iron; it is called ferrite.)
8. Air.
9. Nitric acid towers for DuPont.
10. Siemens.

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- ☐ In black and gilt frame, 11x14, \$3.50
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